
Cost and Performance Summary Report

Thermal Desorption at the Reich Farm Superfund Site

Pleasant Plains, New Jersey

Summary Information [1,2,3,5]

The Reich Farm Superfund Site (Reich Farm) is a three acre site located in Pleasant Plains, New Jersey. In 1971, the site was leased by an independent waste hauler and used for a five-month period to dispose of 55-gallon drums containing organic solvents, still bottoms, residues, and other wastes. In December 1971, the owners of Reich Farm found 4,950 drums at the site (4,500 drums containing waste and 450 empty drums), along with several trenches that had been used for waste disposal. Labels indicated that the drums belonged to Union Carbide. From 1972 to 1974, in response to a Court Order, Union Carbide removed drums, trench waste, and contaminated soil from the site. In 1974, the Dover Township Board of Health closed 148 private wells that were found to be contaminated with organics, and restricted groundwater use in the area of Reich Farm.

The site was listed on the National Priorities List in September 1983. Results of the Remedial Investigation, performed in 1986 and 1987, showed that groundwater and subsurface soils at the site were contaminated with volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Groundwater contaminants included trichloroethene (TCE), acetone, and methylene chloride. Soil contamination, including VOCs and SVOCs, was found in several hot spot areas of subsurface soils (greater than five feet deep) at the site.

A Record of Decision (ROD) for the site was signed in September 1988 addressing both soil and groundwater at the site. The ROD specified extraction, treatment, and reinjection of groundwater and excavation and on-site treatment using enhanced volatilization of soil. This report addresses the thermal treatment of contaminated soil at the site.

From October 1994 to February 1995, soil was excavated from three areas of contamination at the site. The excavated soil was segregated into 200 cubic yard stockpiles and tested for VOCs and SVOCs. Stockpiles where VOC and SVOC concentrations were above the cleanup levels were sent to a contaminated soil staging area for treatment; those with concentrations below the cleanup levels did not require treatment and were backfilled on-site.

Of the 17,286 cubic yards of potentially contaminated soil excavated from the three areas, a total of 14,836 cubic yards was determined to have VOC and SVOC concentrations above the cleanup levels and, therefore, required treatment. Thermal treatment of the contaminated soil was performed from November 1, 1994 to March 10, 1995.

CERCLIS ID Number: NJD980529713

Type of Action: Remedial

Lead: PRP Lead/Federal Oversight

Timeline [1,2]

September 30, 1988	ROD signed addressing soil and groundwater contamination
March 1990	Consent Decree signed for Union Carbide to perform remedial design and remedial action for the site
October 1994 to February 1995	Excavation of three areas of contamination at the site
November 1, 1994 to March 10, 1995	Thermal treatment performed
March 13 to May 17, 1995	Demobilization and site restoration
August 2, 1995	Final site inspection by EPA verifying that soil remediation had been completed

Factors That Affected Cost or Performance of Treatment [1,4]

Listed below are the key matrix characteristics for this technology and the values measured for each during site characterization.

Matrix Characteristics

Parameter	Value
Soil Classification:	Primarily coarse sand with small amounts of clay and silt
Clay Content and/or Particle Size Distribution:	Information not provided
Moisture Content:	< 10%
Petroleum Hydrocarbons:	Information not provided
Bulk Density:	Information not provided

Treatment Technology Description [1,4]

The thermal treatment system used for this application was a transportable low temperature volatilization system (LTVS) owned by Four Seasons Environmental, Inc. The system consisted of a transportable thermal desorption unit mounted on a trailer. The desorber was 38 feet long and eight feet in diameter and had a maximum throughput of 45 tons/hour. The primary treatment unit was directly heated with a 50 million BTU/hr burner that used #2 fuel oil. Air pollution control equipment for the system included a multi-cyclone, thermal oxidizer, heat exchanger, dry scrubber, and baghouse. No information was available about the preprocessing of soil prior to treatment.

Operating Parameters [1,4]

Listed below are the key operating parameters for this technology and the values measured for each.

Operating Parameter	Value
Residence Time	8 to 12 minutes
System Throughput	45 tons per hour (maximum)
Soil Exit Temperature	650 to 750 °F

Performance Information [1,3,5]

The soil cleanup levels specified in the ROD were 1 mg/kg for total VOCs and 10 mg/kg for total SVOCs.

The air emissions standards for this application were specified in the NJDEP Air Pollution Control Permit Equivalent for the unit. The standards included no visible emissions and:

- nitrogen oxides - 19.00 lb/hr
- carbon monoxide - 3.17 lb/hr (50 ppmv @ 7% O₂)
- VOCs - 0.95 lbs/hr (25 ppmv @ 7% O₂)
- total suspended particulates - 3.12 lb/hr (0.02 gr/dscf)
- respirable particulates (PM-10) - 3.12 lb/hr (0.03 gr/dscf)
- sulfur dioxide - 13.1 lb/hr
- hydrogen chloride - 4.1 lb/hr
- total toxic substances - 0.00345 lb/hr

In addition, the thermal oxidizer was required to operate at a minimum destruction efficiency of 99.9% for all VOCs or to reduce the total VOCs to no more than 25 ppmv corrected to 7% O₂.

According to the RPM, no stack monitoring was performed during system operation. Rather, air quality monitoring was performed at the site's perimeter and the temperature of the desorber was monitored. The RPM indicated that no exceedances of air quality at the site's perimeter were reported. The results of an opacity test, performed in January 1995, showed 0% opacity over the three 1-hour test runs.

A total of 14,836 cubic yards of contaminated soil were treated from November 1, 1994 to March 10, 1995. All treated soil met the cleanup goals of 1 mg/kg for total VOCs and 10 mg/kg for total SVOCs, and was backfilled on site. No information was provided about the specific VOC and SVOC concentrations in the treated soil or whether any soil required retreatment prior to meeting the cleanup goals. Data was not available on the initial contaminant concentrations in the untreated soil.

Performance Data Quality

Sampling and analysis for this project were conducted in accordance with the approved QA/QC plans and protocols. No deviations were noted.

Cost Information [4]

Table 1 presents cost information for this project that was provided by Union Carbide, based on actual costs. The total project cost was \$4,115,00, including \$2,205,000 the thermal treatment application and \$1,910,000 in other project costs such as excavation sampling, soil excavation, and sheeting and shoring of the excavation. The \$2,205,000 corresponds to a unit cost of \$147 per cubic yard of soil treated.

Observations and Lessons Learned

LTVS treated 14,836 cubic yards of soil contaminated with VOCs and SVOCs to below the cleanup goals over a period of approximately four months.

Table 1 - Actual Project Costs [4]

Cost Category/Element	Cost (1995 \$ Basis)
1. Capital Cost for Technology	
Technology mobilization, setup, and demobilization	80,000
Planning and preparation	60,000
Site work - preparation/restoration	155,000
Equipment and appurtenances - thermal treatment and compliance testing	1,310,000
Soil treatability testing, design and specification preparation	300,000
Other - engineering oversight	300,000
<i>TOTAL CAPITAL COSTS</i>	2,205,000
2. O&M for Technology	
Labor; materials; utilities and fuel; equipment ownership, rental, or lease; performance testing and analysis; other	Included in capital costs
3. Other Technology-Specific Costs	
Pre-excavation soil sampling to establish excavation limits	415,000
Sheeting and shoring	1,050,000
Soil excavation/backfill and compaction	400,000
Bottom of excavation soil sampling	125,000
4. Other Project Costs	0
Total cost (year basis for cost)	4,115,000
Total cost for calculating unit cost	2,205,000
Quantity treated	14,836 cubic yards
Calculated unit cost	147 per cubic yard
Basis for quantity treated	quantity of soil treated in thermal desorber

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References

The following references were used in the preparation of this report.

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2. EPA. 1999. National Priority Site Fact Sheet. Reich Farm New Jersey. January 28.
3. EPA. 1988. Record of Decision. Reich Farm, Pleasant Plains, New Jersey. September 30.
4. Craig Wilger, Union Carbide. E-mail to Richard Weisman, Tetra Tech EM Inc. EPA/TIO Cost and Performance Report - Reich Farms Thermal Desorption Cost and Operating Parameter Data. November 8, 1999.
5. Jonathan Gorin, EPA. Telephone Conversation with Richard Weisman, Tetra Tech EM Inc. re Comments on the Draft Report for Reich Farms. January 18, 2001.

Acknowledgments

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